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ABSTRACT

This report is a synthesis of five research studies comparing the facilitative effects on learning of searching and reception modes of study. The following five studies are discussed: (1) J.E. Dale, the effects on achievement of using the forced inferential response mode in an intermediate grade population-geography unit; (2) D.D. Dumbleton, the effects of guided inquiry and expository materials on cognitive learning, retention, and transfer in a social studies unit for secondary level students; (3) E.P. Fishburne, a comparison of a programmed and a non-programmed text on evolution for the fifth grade; (4) J.C. Pelletti, the effects of graphic roles on learning geography materials in the middle grades; and (5) F. Thomas, the use of programmed instruction for teaching anthropology in the fifth grade. The results of the studies show no significant difference in favor of reception over searching modes. Searching modes, however, are comparatively inefficient when time is a measured variable. The report suggests the need for more systematic research of teaching techniques in social studies which involve the examination of many variables such as learning task, and pupil and teacher aptitude and attitude. Also included is an historical explanation of the popularity of inquiry. (Author/RM)

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TREATMENT, TIME, AND ACHIEVEMENT: DO SEARCHING MODES OF STUDY FACILITATE LEARNING?

by

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Introduction

This report is a synthesis of five research studies comparing the facilitative effects on learning of searching modes of study compared to reception modes conducted by research assistants with the Georgia Anthropology and Geography Curriculum Projects. Some attention will be given to the findings of major summaries, such as Shulman and Keislar (1966) of discovery learning and Hermann (1969) of egrule-ruleg paradigms. The paper will conclude with an historical explanation of the popularity of inquiry, and raise the question of long-term implications for social studies teaching and research.

This report grows out of the current emphasis in social studies on inquiry as opposed to reception modes despite the lack of empirical evidence to support the alleged superiority of the inquiry mode. The results of the studies reported herein show no significant difference in favor of reception over searching modes. However, searching modes are comparatively inefficient when time is a measured variable.

Since schooling in social studies takes place within a limited amount of time, the report suggests that social studies curriculum research needs to give more attention to replicable, operational treatment and product definition and consideration of time as a variable in instructional efficiency. The preoccupation with process over knowledge as an outcome of school learning may further contribute to the low priority of social studies as a school subject.

The Five Studies

Graphics in the facilitation of learning. In the development of population units which would make extensive use of a mode other than straight narration with a few graphic illustrations, the Geography

Curriculum Project conceptualized the Forced Inferential Response Mode, called FIRM. The FIRM treatment presented the data in the form of a graphic data base, and required the student to derive a meaningful message by searching the data base to complete a response stem. An alternate narrative treatment was easily constructed by simply filling in the response stems, and having students read the narration with the graphics simply appearing as illustrations. This permitted the development of two different treatments with identical content.

In 1972 Dale developed two alternate treatments for a unit Population Growth in Mexico and the United States in a self-instructional format. These units were field tested with pupils in the fifth, sixth, and seventh grades. After adjusting scores on an investigator constructed achievement posttest for vocabulary knowledge, map skill, and graph and table reading skill, as measured by the Iowa Test of Basic Skills, he found no significant difference ($p<.05$) between the FIRM and the narrative treatment. He failed to collect specific time-to-completion data by individual student, but reported that students using the FIRM unit required more time to complete the material. The Dale study did not support the hypothesis that a searching mode of self-instruction was superior to a purely narrative mode, although this treatment required more time.

In 1973 Pelletti conducted a follow-up study involving a self-instructional unit Black Population Distribution and Growth in the United States. In addition to the FIRM and narrative treatments of Dale, he utilized three other treatments--graphics as reinforcement with a narrative using questions; a narrative text with questions without graphics; and a narrative only. As in the Dale study, content similarity was maintained by construction of the FIRM treatment, with treatment variations based on the same content. The unit was tested with fifth, sixth, and seventh grade students.

The Pelletti study confirmed the earlier finding of Dale that graphics in the role of primary communication which required a searching behavior on the part of students did not facilitate the learning of population geography as measured by an investigator constructed test of cognitive achievement, map skills, and graph and table reading skills. Nor did any other types of treatment which required the student to be more active, such as the completion of questions facilitate learning.

The only positive finding of the study, as was expected, had to do with time. Students forced to construct responses, either by questions or incomplete statements, take substantially longer time to complete their work than when they merely have to read and assimilate content from a straight narration without an increment in learning.

These two studies are by no means conclusive. But they do suggest that we need not only to test assumptions about the facilitative effects of graphics on learning, but the fact that procedures which require the student to spend more time in learning automatically contribute to greater knowledge gains.

Programmed instruction and narration. One of the most common forms of instruction, which permits research without teacher intervention, is programmed instruction. Based on stimulus-response learning theory, it requires the student to respond to a stimulus, in the form of a question or incomplete statement, before proceeding to another instructional frame. Consequently, the student is individually involved, rather than being involved as a part of a class. He must be individually involved in order to achieve his task.

In 1971 Fishburne compared a programmed text with a narrative text on evolution at the fifth grade. The narrative text was constructed by converting the program into a straight narrative. In comparing the two treatments, he utilized a posttest and a delayed posttest as a retention measure. Student achievement was significantly higher ($p<.01$) in favor of the programmed text. However, the programmed treatment required 118 as compared to 52 minutes for the narrative treatment.

Fishburne's findings are consistent with other studies comparing programmed with narrative texts--some superiority, but not always, and more time to complete. As Fishburne points out, the advantage may not be in the overt response that actively involves the student, but may result mainly from a difference in time. The apparent inferiority of narrative texts may be the failure of the student to develop adequate study habits in which he makes covert verbal responses as he studies--not merely reads with a light once over.

Programmed instruction and class involvement. In 1967 Thomas developed a programmed text Archeological Methods which was field tested at the fourth grade. She compared a programmed text treatment with a four-day conventional classroom treatment, in which children were involved in many simulation activities and "traditional" classroom instruction. She did not find any superiority for the programmed text over regular classroom instruction, but found that mean time-to-completion for the programmed treatment half that of the regular class instruction. The lack of control over what the various teachers did as a part of student "involvement" flaws any kind of interpretation. Her study suggests that many concrete activities which are often considered as necessary for student involvement may be rather ineffective in terms of measureable knowledge outcomes.

Reception and guided inquiry. In 1973 Dumbleton compared the relative effectiveness of reception and guided inquiry materials, both in a self-instructional format, with upper-grade high school students. The guided inquiry materials consisted of readings with introductory passages and a workbook which required students to search for answers in the documents. The reception materials consisted of a narrative text, written from the readings, and the same workbook. No point was emphasized in the workbook which was not carefully checked against the content of the readings and the narrative. Measures of achievement

included investigator constructed tests of learning, retention, and transfer. No significant difference by treatment was found on any of the measures. It was thought that there would be a significant difference in time spent in the two different treatments, but treatment time within class tended to be the same. Pupil response to the inquiry material, however, was less favorable than to the narrative text.

Three of the studies cited do not lend support to the popular belief that modes of behavior which require more searching on the part of the student facilitate learning. In the Fishburne study, it appears that the superiority of searching in a programmed text format is a function of time spent in learning. The results of the Thomas study are equivocal in terms of the different focus of her study. These results, however, tend to be consistent with other summaries of research studies.

Major Research Summaries

On the whole, the social studies inquiry movement has neglected to take into account some of the critical summaries of inquiry-discovery research as compared with reception or expository teaching. Among the most comprehensive of these reviews are Shulman and Keislar (1966), Ausubel (1968), and Hermann (1969). These summaries and critiques of research do not lend experimental support to the claims which discovery-inquiry advocates make. In the social studies, the only caveat to the extravagant claims of inquiry were made by Sanders and Tanck in their 1970 review of projects in Social Education. They pointedly called attention to the critique of Shulman and Keislar. In his dissertation, Dumbleton undertook a comprehensive review of inquiry-expository research. He concluded, "the great vogue of discovery and inquiry in the social studies is not based on experimental evidence . . . . No clear superiority for either discovery or exposition is found in any discipline [p. 13]." One reason that makes an inquiry-reception comparative research very difficult is the lack of operational definition of inquiry. There is also a tremendous amount of confusion as to the treatment being compared. Is it curriculum as an artifact, as in the studies which I reviewed, or is it a teaching method? If it is the latter, I know of no studies in which the teacher variable has been adequately controlled.

Need for Research Involving Many Variables

In a paper which I read at the Social Science Education Consortium in 1972, I called attention to the need for systematic research in social studies which involve the examination of many variables. Unless learning task, pupil, teacher, and other variables are successively and concomitantly

considered, our research in social studies will continue to be very unproductive. We can predict in advance that comparisons of treatments will generally result in no significant differences or equivocal results difficult to interpret. This results from the fact that all treatments involve the same language if the same content is under consideration. Most treatments are too weak where only gross population means are being considered. Thus, in particular, treatments must take into account differences in pupil and teacher aptitude and attitude. For this reason I personally advocate a treatment by block design, rather than analysis of covariance. The latter permits us to exclude what we should be looking at--the relationship of treatment to other variables that influence learning.

The Popularity of Inquiry

The decade of the 60's was the decade of the New Social Studies. The "new" social studies was, and still is, synonymous, with inquiry or discovery methods. What accounts for the tremendous popularity of inquiry, and the tendency to make extravagant claims for the methodology, when there is so little experimental evidence to justify these claims? The marketing literature of the National Science Foundation developed projects is a case in point.

My own interpretation is that popularity of inquiry simply stems from the fact that it fits into the conventional wisdom of American pedagogy. Space does not permit a documented historical explanation, which I have discussed previously under the heading "Formalism and Naturalism." While there are superficial tones to some aspects of inquiry as scientific methodology, most inquiry falls in the direction of the romantic naturalism of Rousseau and Pestalozzi. Since the days of Yverdon, the ideal of the normal school has been to train a teacher who has the capacity to stimulate, to encourage, to guide, and to involve the child in an active searching mode of learning. The Progressive Movement did not initiate these ideas. They were imported by Horace Mann and other American observers in the early nineteenth century, and their adaptation may be seen in the work of Sheldon at Oswego and Parker at Quincy long before the days of Dewey and Kilpatrick. The dominance of this tradition is seen in the current popularity for the "open school," another new slogan for naturalism. Sometimes a more value-laden slogan is used, such as humanistic education. These contemporary trends share a philosophic view of the natural goodness and curiosity of the child and a preference for open rather than closed methods of instruction. "Inquiry" not only neatly fits this conventional wisdom, but is also a direct continuation of the formal steps of problem solving. Just as every phase of the American curriculum today has to be forced into an inquiry model--even physical education and the dance--all curriculum in the 1940's and into the 1950's was dominated by problem solving. The popularity of pedagogy since Pestalozzi has held that the more involved a student is in his own learning, the "better" the student

will learn. As Cremin (1961) has pointed out, this point of view eventually transformed the American school. Inquiry in the 1960's and today is merely a continuation of a long tradition. Perhaps in the social studies Hilda Taba is the best example of a person who successfully translated to the 60's the spirit of the 1920's.

Implications for National Policy

Inquiry has been institutionalized in American education under the aegis of national funding agencies, such as the National Science Foundation and the U. S. Office of Education. Here is an interesting example of how research is utilized to merely justify predetermined outcomes. A prerequisite to funding has been inquiry modes, such as spelled out in the guidelines for Environmental Education Grants. Since the programs begin with the fundamental assumption of methodological superiority, the research is as objective as a lawyer's brief. Even when the evidence does not justify the hypothesis, the researcher is able to literally have his cake and eat it too by finding other desirable outcomes.

Open ended and searching modes of instruction do not automatically preclude an emphasis on knowledge and methodological skills of a discipline. The impression that the inquiry mode often gives to teachers, however, is that the process of inquiry is more important than the acquisition of knowledge. Certainly the two should go hand in hand. Already in this country certain instructional problems have arisen because of a doctrinaire adherence on the part of college pedagogues to certain approaches. In reading, the look and say method still dominates, even when it is related to lack of reading achievement. The new math threatens also to spawn another generation of illiterates in arithmetic. Is it not a contradiction that under the aegis of scholarship we may find ourselves in the United States perpetuating teaching modes that may be relatively inefficient and ineffective?

Conclusion

The scope of this paper has permitted only superficial treatment. It has primarily called your attention to the fact that notwithstanding the popularity of searching modes of treatment in the social studies, achievement, as measured by learning, retention, and transfer do not show any significant difference. Where time is a controlled variable, however, inquiry modes are relatively inefficient as compared to expository modes. This does not lead necessarily to the conclusion that expository modes are superior to inquiry modes. Time differentials, however, may be one of the most significant factors in learning. If one treatment substantially economizes student time in learning, this quantitative difference in cognitive background may eventually result in a substantial

qualitative difference. Because a student may acquire more knowledge with which to make connections and from which to make inferences, it is possible that a quantitative knowledge base is the critical difference on which qualitative differences in both achievement, retention, and transfer are ultimately based. Searching modes of study, irrespective of the name under which pursued, have failed to demonstrate a superiority over less time consuming methods. This result should make scholars in the field of social studies less doctrinaire about inquiry claims. At the same time it should impel a more intensive search in the variables which facilitate or retard school learning.

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Appendix A

Treatment Studies: Georgia Anthropology and Geography Curriculum Projects

Dale, J. R. The effects on achievement of using the forced inferential response mode in an intermediate grade population-geography unit. Unpublished doctoral dissertation, University of Georgia, 1972.

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